INTEGRATING REGIONAL TRANSPORT NETWORKS

FOR MANY YEARS, COUNTRIES IN THE ESCAP REGION HAVE UNDERSTOOD THE IMPORTANCE OF HAVING EFFICIENT TRANSPORT INFRASTRUCTURE TO ACCESS AND COMPETE ON THE WORLD MARKET AND PARTICIPATE IN GLOBAL SUPPLY CHAINS.

While international trade has relied predominantly on maritime transport as the most efficient and cost-effective mode to move vast volumes of cargo, the recent growth in intra-regional trade has increased the relevance of more direct land transport routes within the region. It is expected that as the economic size of trading partners in the region increases and transport connectivity improves, intra-regional trade will continue to increase significantly. Illustrating this trend, while China was the fourth largest trading partner for the members of the Association of Southeast Asian Nations (ASEAN) in 2000, after the United States of America, Japan and the European Union, it has been the first one since 2009. Bilateral trade between China and ASEAN members reached $232 billion in 2010, up from $32.3 billion in 2000. Over the same period, India’s trade with ASEAN members has grown at an annual average growth rate of close to 20 per cent, reaching $55 billion in 2010, while its trade with China also jumped from $7.6 billion in 2003 to $66.6 billion in 2012.

1
To meet the growing transport demand resulting from increased intra-regional trade, there is a critical need to upgrade and expand the capacity of regional transport networks, notably by better integrating different transport modes. However, developing regional land networks requires a high level of coordination, with each international transport link depending on a shared commitment from all participating countries along a corridor. To facilitate the process, ESCAP has been supporting its member countries in identifying key regional networks through a series of corridor studies.

Following these studies, two networks were identified and formalized through two Intergovernmental Agreements, namely: the Intergovernmental Agreement on the Asian Highway Network, which came into force in July 2005, and the Intergovernmental Agreement on the Trans-Asian Railway Network, which came into force in June 2009, respectively. These networks now comprise 143,000 km of roads and highways and 117,000 km of rail routes of international importance respectively.

These agreements play a catalytic role in the coordinated planning and construction of roads and railway lines of international importance. Recent progress and development of these two networks will be reviewed in the first section of this Chapter.

The second section of this Chapter will present the different ongoing initiatives related to the integration of these land transport networks. For governments, the challenge lies in providing better access to goods and services in support of economic and social development, while at the same time minimizing the negative externalities arising from a rapidly growing transport sector. In this regard, the realization of an international integrated intermodal transport and logistics system for the region is essential for the optimization of existing infrastructure and re-balancing between existing modes. In particular, it enhances the options for freight to move on more environmentally friendly modes such as railways and inland water transport. A critical initiative led by the ESCAP in this respect is the development of a network of dry ports of international importance and promotion of inland container depots.

**BOX 1.1 CRITERIA FOR INCLUDING SPECIFIC LINKS INTO TAR AND AH NETWORKS**

- Capital-to-capital links
- Connections to main industrial and agricultural centres
- Connections to major sea and river ports
- Connections to major container terminals and depots
The role which land transport plays in regional economic integration depends greatly on the quality of the related infrastructure, the absence of ‘missing links’, the existence of common technical standards as well as the level of non-physical barriers (e.g. administrative hurdles at border crossings). The following section elaborates the progress made in these areas, with the exception of non-physical barriers which are addressed in Chapter 2.

**ASIAN HIGHWAY**

The Asian Highway (AH) network provides the critical road links between countries of the region. While the AH network represents less than one percent of the total length of all roads in the ESCAP region, it is estimated that it connects close to one billion people or 50 per cent of the total urban population in the participating countries.²

The relevance of the network, however, depends on the quality of the roads. Poor road quality can act as a deterrent for international transport due to the resulting high vehicle operating costs or long journey times. Although the quality of the AH network across and within member countries remains uneven, significant efforts have been made to upgrade or extend road sections. As indicated in Figure 1.1 below, between 2006 and 2010, member States upgraded about 9,300 km or 6.5 per cent of the AH network to a higher design class. Data collected by ESCAP from members of the Asian Highway showed that as of the end of 2010, Primary and Class I sections covered about 30 per cent

### BOX 1.2
**DEFINITION OF AH ROAD CLASS**

Road Class refers to the Asian Highway classification and design standards, which provide the minimum standards and guidelines for the construction, improvement and maintenance of Asian Highway routes. Design standards such as the number of lanes, the design speed, the minimum radius of curve or the type of pavement are among the criteria differentiating the AH Road Class. For instance, Primary refers to access-controlled highways while Class III is regarded as the minimum desirable standard. For further technical details on each Class, please refer to the Annex II of the Intergovernmental Agreement on Asian Highway.³

### FIGURE 1.1
**PROGRESS IN UPGRADING ASIAN HIGHWAY ROUTES, 2004-2010**

<table>
<thead>
<tr>
<th>Year</th>
<th>Primary</th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Below Class III</th>
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<td>29</td>
<td>37.8</td>
<td>36</td>
<td>21.7</td>
<td>16.3</td>
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</table>
of the network, while Class II and III sections accounted for 62 per cent of the network. The proportion of roads under class III fell from 16 per cent to 8 per cent of the total network during the period between 2004 and 2010 (see Box 1.2 for more information on Road Class definition).

Despite progress in the upgrading of the Asian Highway, a significant proportion of the network in some countries still falls below class III standards and requires considerable investment to meet the minimum standards. Notably, almost two-thirds of 11,915 km of roads under class III are in Afghanistan, Mongolia, Myanmar, Pakistan and Tajikistan. The upgrading of the AH sections that do not meet the minimum class III standards is particularly important, given that many of these roads are vital for these countries to connect to neighbouring countries as well as for the region as a whole. An example of how a project in one country can impact regional connectivity as a whole is given in Box 1.3.

While land transport is important for all countries in the Asia-Pacific region, it is vital for the landlocked developing countries (LLDCs) who rely mainly on land connections to access world markets. Thanks to the strong commitment of countries and various bilateral and multilateral efforts, particularly under the Central Asia Regional Economic Cooperation (CAREC) initiative, major achievements in developing and upgrading the Asian Highway routes have been achieved in these countries. Approximately 30 per cent of the AH roads in these countries (corresponding to more than 10,000 km) have been improved since 2004. Over this same period, the portion of AH routes below the minimum class III standard has decreased from 32 per cent to 18 per cent, leaving about 6,800 km of AH routes that need to be upgraded to meet the minimum standard. The cases of two landlocked countries, Nepal and Tajikistan, are presented in greater detail in Box 1.4 and Box 1.5.

**BOX 1.3**

**ASIAN HIGHWAY (AH1) IN SOUTH-EAST ASIA**

An upcoming project that could enhance regional connectivity is the “Tri-lateral Highway Project” connecting India (Moreh) and Thailand (Mae Sot) through Myanmar along the AH 1. This project is expected to result in improved connectivity between the South and South East Asia subregions. The current status of the road quality is indeed relatively poor as most road sections in Myanmar are either only Class III or below. The Government of India is providing a loan of $500 to the Government of Myanmar, part of which is intended for work on this project. The project is scheduled for completion in 2016.
With bilateral and multilateral funding assistance from China, India, and development banks, Nepal has been implementing a number of road projects. These have mainly involved the upgrading and improvement of existing roads between Nepal and India, which is by far Nepal's largest trading partner, accounting for about 60 per cent of Nepal's trade and providing its main point of access to the sea. Such improvements are needed as it is currently estimated that inland transport can take anywhere between 10 to 20 days to travel from Kathmandu to Kolkata, a distance of around 1,100 km. Reducing key infrastructure bottlenecks in Nepal, as well as adopting a modern approach to border management between the two countries is the objective of a $100 million project scheduled to start in 2013. Included in this project are the upgrading of the Narayanghat-Mugling road section of the Asian Highway (AH42), which carries approximately 90 per cent of Nepal's international trade traffic (about 6,000 vehicles per day), as well as infrastructure improvements at Birgunj inland container depot (ICD) in order to reduce the time spent at borders (for recent developments related to the ICD will be further detailed in the section below on dry ports).

Tajikistan has implemented a number of road projects to improve its domestic and inter-country connectivity with Afghanistan, China, Kazakhstan, Kyrgyzstan, and Uzbekistan. It has constructed and/or rehabilitated 1,650 km of highways in its territory, improving road communication between Dushanbe and border points with China, Kazakhstan, Kyrgyzstan, and Uzbekistan. Ongoing projects in neighbouring countries will also have an impact on Tajikistan’s regional connectivity. These projects include the rehabilitation of the Shymkent-Tashkent road section (estimated at $350 million) and the upgrade of the Almaty-Horgos road section (estimated to cost more than $1 billion).
To support the development of the AH network, ESCAP has carried out numerous activities over the years. Recently ESCAP has been involved in the implementation of a project on “Promotion of Investment in the Asian Highway Network: Feasibility Studies of Priority Sections”. Under this project, ESCAP provided technical assistance to Bangladesh, Kyrgyzstan, Mongolia and Myanmar to undertake feasibility studies of selected priority routes and promote investment in the Asian Highway. National workshops to build capacity to undertake feasibility and investment studies were also delivered in those countries. Additionally, ESCAP has organized four meetings of the Working Group on the Asian Highway where proposals for amendments to the Intergovernmental Agreement are considered. These meetings facilitate cooperation on road transport planning among the participating countries.

While countries in the ESCAP region are currently linked by the Asian Highway network, there are still infrastructure gaps within countries which hinder the utilization of this network. Indeed, this infrastructure acts as a feeder for regional networks like the Asian Highway. In that respect, investments in national overall road networks also have an important impact on regional connectivity.

In that respect, it is worth noting that the overall length of the network has continuously increased for all countries in the region, as detailed in Figure 1.2.

**Figure 1.2**
*Road length - average yearly growth in selected ESCAP countries*

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**Source:**
ESCAP based on World Bank Database, ASEAN-Japan Transport Partnership (http://www.ajtpweb.org/), Nepalese Central Bureau of Statistics (CBS) (Nepal in Figures), Indian Ministry of Road Transport and Highways (Basic Road Statistics of India), Ministry of Land, Transport and Maritime Affairs (Republic of Korea), Turkish General Directorate of Highways and General Directorate for Local Authorities and ADB (Mongolia Road Sector Development to 2016)
In absolute terms, road expansion has been particularly impressive in China and India, with both having a road network of several million kilometres. In China, the average yearly increase in highway kilometres for the period 2009-2011 was above 125,000 km. In India, the overall network has increased by over a million kilometres since 2004 (mainly rural roads as the total length of national and state highways has increased by 36,086 km to 234,832 km over the same period (2004-2011)). Unsurprisingly, countries with very dense networks like Japan, Singapore or Bangladesh, or with well established transport systems such as Australia and New Zealand have experienced lower growth rates. Most growth has actually occurred mainly in the Least Developed Countries (LDCs), which have a relatively lower starting baseline and strong needs for infrastructure expansion.

The growth rate in the total network length is, however, only one indicator of the development of the road sector. As mentioned before, the condition of the road is probably as important as the size of the network. For instance, while the growth rates in LDCs are particularly encouraging, one should not overlook that these networks remain largely unpaved (see Figure 1.3). On the other hand, some countries which appear to have relatively low growth rates have nonetheless invested heavily in developing or upgrading their major road infrastructure. For instance, Turkey has almost doubled its network of highways during the 2006-2012 period while its average yearly growth for the whole network was only 1.7%.

Finally, expanding road networks should be considered in conjunction with road maintenance issues, as each additional kilometre will increase the overall need for maintaining existing assets. Allocating sufficient resources for maintenance has historically proven to be a challenge for countries in the region (see Box 1.6). This is particularly important as inadequate expenditure on road maintenance can significantly increase the long run costs to the owner of the road (usually the government), as well as the vehicle operating costs for road users.

**FIGURE 1.3**
**PAVED RATIO IN ESCAP LEAST DEVELOPED COUNTRIES (LDCS)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Paved Ratio</th>
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<tbody>
<tr>
<td>Bangladesh</td>
<td>2010</td>
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<td>Bhutan</td>
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</tr>
<tr>
<td>Myanmar</td>
<td>2011</td>
<td>21.8%</td>
</tr>
</tbody>
</table>

**SOURCE:**

**NOTE:**
no recent data were available for Afghanistan
In conclusion, the figures presented in this section confirmed that impressive progress in road networks has been achieved in the region. This should contribute to improved access for the population, as well as create the possibility for a larger share of the population to benefit from regional integration. Such improved connectivity remains, however, highly dependent on the quality of the infrastructure, which in turn depends on adequate design, planning, financing and maintenance practices.

**BOX 1.6**

**ROAD MAINTENANCE - A CRITICAL BUT NEGLECTED ISSUE**

Policy reforms for road maintenance and road funds were introduced in the region nearly 20 years ago by ESCAP, the World Bank and other development partners. Despite progress in some countries, however, road maintenance remains a major challenge for most countries in the region. This is partly due to the fact that motorization rates are increasing, while governments continue to construct new roads without due attention to the management and maintenance of existing road assets.

In this regard, ESCAP, the World Bank in Viet Nam, and the Directorate of Roads of the Ministry of Transport of Viet Nam, jointly organized an Expert Group Meeting on Road Maintenance and Management in May 2013 in Hanoi, Viet Nam. The meeting brought senior government officials from South and South-East Asia together to discuss current issues in road maintenance, including challenges such as insufficient and irregular funding for maintenance; the low level of priority given to maintenance by policy-makers; the challenge of coordination amongst different agencies involved in maintenance; and ways to involve the private sector, local people and communities in the maintenance process as the issue of maintenance cannot be addressed by governments alone. The development of a “maintenance culture” and change in attitudes towards maintenance was stressed, as well as the need to approach roads using a life-cycle approach so that the long term maintenance needs were appropriately “costed” into the planning and construction phases. In particular, the meeting noted the urgent need to improve the maintenance of rural roads was highlighted, as these roads served as lifelines of communities in rural areas. Future work by ESCAP in this area will aim to revitalize the road maintenance initiatives started in the 1990s and to re-establish road maintenance as an important issue in the international development agenda.

*NOTE:* Women from the Lang Chanh District, Thanh Hoa province of Viet Nam, working to maintain local roads to their village” (May 2013)
While the road sector has remained the key focus of investment throughout the region, significant progress has been achieved to improve rail connections within and between countries of the region. In particular, increased resources have been directed at modernizing existing infrastructure and replacing old rolling stock. These efforts, however, have not been uniform across the region. A short overview of rail infrastructure in the Asia-Pacific region is provided in the next section, followed by a more in-depth analysis of regional corridor development and the role of the Trans-Asian Railway network.

Recent trends in the Railways
Figure 1.4 below gives an overview of the current situation regarding the size of the network in each country, its expansion (percentage of growth over the period 2001-2011) as well as the intensity of its use for freight transport, estimated on the basis of annual average tonnes of freight per each km of the network (ranging from 38.7 tonnes per km of network for China to 0.23 tonnes per km of network for Pakistan).

The figure also shows that rail freight in the region has so far been dominated by four major players, China, India, Kazakhstan and the Russian Federation (upper half of the chart) which are also among the countries having the longest rail network in absolute size (represented by the size of the bubble on the chart). Unsurprisingly, countries with active mining industries, such as Australia and Mongolia, are also intensively using their rail network for freight movements. In 2010, the Government of Mongolia approved the expansion of the country’s rail network by over 1,800 km of new heavy axle-load routes to connect the country’s deposits of mineral ores to international markets.

It can be observed that South East, South and South West Asian countries (with the exception of India) currently have a fairly low usage of rail in comparison with road.
Most of these countries carry only limited freight volumes by rail, and although they provide an important service for passenger transport, many railway organizations are operating without profit or at a loss due to various factors, including lack of investment in networks and limited flexibility in setting passenger ticket prices. However, some countries are starting to invest more seriously in their railway networks. For example, Turkmenistan has increased the size of its network by 26.2 per cent, while Turkey has increased its network by 10.6 per cent, in particular through the construction of high-speed lines. Some recent developments in rail infrastructure and ongoing initiatives to improve railway operational efficiency are described in the next section.

**Future Infrastructure Plans**

Investment in railway infrastructure projects will be a critical factor in determining the attractiveness of rail for shippers and transport operators involved in cross-border freight movements in the region. In this respect, the construction of ‘missing links’ is particularly important to improve the operational readiness of regional rail linkages (see Box 1.7).

**BOX 1.7**

**MISSING LINKS**

A missing link results from the absence of physical tracks between the railway networks of neighbouring countries or the absence of continuous railway infrastructure within one country. These missing links prevent the network from functioning as a continuous system. According to ESCAP estimates, these constitute about 10,500 km of rail track (or approximately 9% of the TAR network), mostly located in the ASEAN sub-region. While these links can be filled by transshipments to trucks, shippers are discouraged from using rail because of the longer transit time and higher costs.

In order to gain a better understanding of the emerging trends in the region, several key railway infrastructure projects aimed at improving rail connectivity at the regional level are presented below.

**East-West Corridor in Central Asia**

In Central Asia, rail routes are being developed to serve East-West transport demand. For instance, the Governments of Azerbaijan, Georgia, Kazakhstan and Turkey signed a Memorandum of Understanding in November 2012 to operate a Silk Wind container block-train service that will run...
from Dostyk, the border station between China and Kazakhstan, to Aktau, a Kazakh port on the Caspian Sea. From there, freight will be ferried across the Caspian Sea to the port of Alyat in Azerbaijan, for onward movement to Baku, Tbilisi and Kars in Turkey via the soon-to-be-completed Baku-Tbilisi-Kars rail project that will connect the rail networks of Georgia and Turkey. The project, which will enable continuation of container block-train services from China, will eventually offer a new route to Eastern and Southern Europe when the Marmaray project is completed (see Box 1.8). Transit along the corridor will further benefit from the construction of the $3.3 billion Zhezkazgan – Beineu railway link (988 km) approved in 2012 by the Government of Kazakhstan. This link would considerably reduce the carriage distance between Dostyk and Aktau (see Figure 1.5). Additionally, in Kazakhstan the opening of a second border crossing point with China at Khorgos in December 2012 is expected to generate further trade between China and Central Asia. The opening of the border point took place in parallel with the construction of a rail section between Khorgos and Zhetingen (close to Almaty) and the establishment of the “Khorgos-East Gate” free economic area (see section below on dry ports).

Finally, other countries in Central Asia are also taking steps to improve their regional rail connections. For instance, a 268 km line from Kashi, China, through Osh, Kyrgyzstan, to Andizhan in eastern Uzbekistan has been in discussion since the late 1990s (see Figure 1.5). However, the high estimated construction cost of around $2 billion has so far prevented the project from being realized. The project received new attention in 2012 with the signing of a Memorandum of Understanding between China and Kyrgyzstan to commission the definition of technical designs. Meanwhile preparation for a feasibility study has already started and it is estimated that the project could shorten the route from China to Europe by 900 km (see Figure 1.5).
North-South Corridor through Central Asia

In addition, as highlighted on Figure 1.6, projects are being implemented to establish north-south corridors linking Northern Europe to the Persian Gulf, along routes either on the western side of the Caspian Sea, i.e. via the Russian Federation and Azerbaijan, or on its eastern side via the Russian Federation, Kazakhstan and Turkmenistan. On the western side of the Caspian Sea, the Iranian Railways have been working for a number of years on completing the 372 km Qazvin-Rasht-Astara link. As of June 2012, 75 per cent of the 205 km section between Qazvin and Rasht had been completed, while work had started on the 167 km section from Rasht to Astara at the border with Azerbaijan.

On the eastern side of the Caspian Sea, a 677 km rail link from Uzen (Kazakhstan) to Bereket-Etrek (Turkmenistan) and Gorgan (the Islamic Republic of Iran) is being built. About 137 km of the link will be in Kazakhstan, 470 km in Turkmenistan and 70 km in the Islamic Republic of Iran, where it will link with the country’s main rail routes connecting to Bandar Abbas and the future port being developed at Chabahar. In May 2013, Kazakhstan and Turkmenistan celebrated the completion of a 146km line from Uzen (Kazakhstan) to Serhetyaka (Turkmenistan) as part of the project.

Meanwhile, bogie changing facilities are being built at the border between Turkmenistan, which operates on a 1.520mm gauge, and the Islamic Republic of Iran which operates on a 1.435mm gauge.

As regards rail development in Armenia, the Government has cleared the way for a feasibility study for a 316-km single-track electrified line section to link the national network to that of the Islamic Republic of Iran at Meghri. In January 2013, a tripartite agreement was signed by representatives of Dubai-based investment fund Rasia FZE, Russian Railways (RZD) subsidiary South Caucasus Railway (SCR) and the Armenian Minister of Transport and Communications. In 2012, Rasia FZE signed a concession agreement with the Armenian government to develop the project on a public-private partnership (PPP) basis. The project has an operating term of 30 years with an option for a 20 year extension.

South and South West Asia

Across South and South West Asia, a number of activities are being undertaken, with a selection presented in the following paragraphs.

In Afghanistan, following the successful completion and commissioning of the 75 km line section between Khairaton and
Mazar-i-Sharif, the Government has defined an ambitious rail development master plan aiming to develop connectivity with its neighbouring countries, thereby offering the long-term prospect of fast rail transit between countries of Central Asia and the ports of Chabahar and Bandar Abbas in the Islamic Republic of Iran and Gwadar and Karachi in Pakistan.

Among the routes included in the plan, the most advanced is the northern east-west corridor with a distance of about 1,250 km from Shirkhan Bandar (border with Tajikistan) to Herat via Mazar-i-Sharif, and two branches to border points with Turkmenistan. Related to this corridor, the presidents of Afghanistan, Tajikistan, and Turkmenistan signed a Memorandum of Understanding in March 2013 to construct a railway line of 400 km that will link the three countries from Aqina to Shirkhan Bandar. The project is expected to be completed by 2015. Other routes in Afghanistan have also been discussed such as a rail link from Kundus to Torkham (Pakistan) via Kabul or a branch line from Pakistan to Kandahar.

In Pakistan, the doubling of railway track between Lahore and Karachi is ongoing. On completion of this project, sectional capacity will increase from 18 to 34 trains daily, while journey times from Lahore to Karachi will be reduced by one hour for mail/express trains and seven hours for freight trains. A feasibility study to connect the seaport of Gwadar with Afghanistan and China by rail will be initiated by the Government of Pakistan in the near future. Additionally, the Government of Pakistan has indicated its interest in developing a high-speed line using technical assistance from China.

In India, the start of construction on an initial 343-km double-track electrified section between Kanpur and Khurja as part of the Delhi – Kolkata dedicated freight corridor marks another significant step towards improved freight transport in the region.
In addition to developing its domestic rail network through a continued policy of track doubling, gauge conversion and electrification, India is also cooperating with its neighbouring countries to facilitate rail network development and put in place efficient cross border linkages. In this regard, work is continuing on the Jiribam-Imphal rail section as a first step towards reaching the border with Myanmar at Moreh. India is also collaborating with Bangladesh to put in place the 11km Agartala (India) – Akhaura (Bangladesh) rail link that will open a new corridor between the two countries, while substantially improving transport connectivity between the north-eastern states of India and the rest of the country and offering access to the port of Chittagong.

Meanwhile, in 2012 the Asian Development Bank and the Government of Bangladesh signed a loan agreement worth $150 million to help improve capacity, efficiency and safety of the country’s railway system. The assistance will help complete double-tracking of the 64km of section Tongi-Bhairab Bazar of the Tongi–Akhaura line. The assistance forms part of a $430 million multi-tranche financial package agreed between the Bank and the Government of Bangladesh in 2006 to revamp the entire railway system.

Two other important projects approved by the Government of Bangladesh are (i) the restoration of cross-border rail operation with India along the Shahbazpur-Mahisashan line section, which was closed to traffic in 2002 due to poor track condition; and (ii) the $2.9 billion road-rail Padma bridge that will connect Dhaka with the southern and south-western regions of the country.
Finally, India is also lending financial and technical assistance to Sri Lanka. It recently provided a $800 million loan for the completion of the 43 km section Madawachi–Madhu section of the Colombo–Talaimannar line (see Figure 1.9). Meanwhile, Sri Lanka has also received a $278 million loan from China to finance the first phase of the 115 km Matara-Kataragama railway extension project. The funds will be used for the initial 26.8 km Matara-Beliatta section of the railway line, which is currently under construction. The other two phases are Beliatta to Hambantota and Hambantota to Kataragama.

South-East Asia

In the ASEAN subregion, the need to develop subregional rail linkages has long been recognized by governments and railway organizations, and related activities are being implemented by the ASEAN secretariat under the Singapore-Kunming Rail Link (SKRL) project as part of the Master Plan on ASEAN Connectivity. Infrastructure development in the subregion is also the focus of the ADB’s Greater Mekong Subregion (GMS) initiative. To facilitate the financing of major infrastructure projects under the Master Plan, an ASEAN Infrastructure Fund was established in 2010, which is supported by funding from both ASEAN members and the ADB (see Chapter 3).

Some concrete progress has been made recently in the subregion. For example, in February 2013, Chinese Railways opened the 141 km line between Yuxi and Mengzi, which will contribute to the development of rail links between China and Viet Nam. Work has also started on the 330 km Chinese section from Dali to Ruili with a view to connecting the rail networks of China and Myanmar (work started on the Dali-Baoshan section in 2008 and on the Baoshan-Ruili section in 2010). When the Dali-Ruili section is completed, the plan is to extend it over 868 km to Myanmar’s deep sea port at Kyaukpyu on the Bay of Bengal.

Another major infrastructure project in the subregion is the development of an industrial and logistics zone in Dawei, Myanmar, with related developments in port infrastructure, highways, railways and industrial estates. An important component of the project is the rail link that will come from Kunming, China via Boten in Lao People’s Democratic Republic, before following the line from Nongkhai to Bangkok in Thailand. From Bangkok, the line would follow the west-bound alignment that currently stops at Namtok, from where a new line will be constructed to cross into Myanmar and go to Dawei (approx. 110 km).
However, the mega project is estimated to cost $58 billion and is fraught with political, economic and financial uncertainties. Attracting foreign and private investors will require substantial changes in Myanmar’s investment laws. In addition, financial considerations have also delayed progress on the 417 km rail project just mentioned between Vientiane to Boten in Lao People’s Democratic Republic. The $7 billion project is now expected to be financed with loans from China (feasibility study completed in June 2012).

This project is part of an ambitious master plan of the Laotian government to develop a modern rail infrastructure and connect it to the networks of China, Thailand and Viet Nam. This master plan also includes a 450 km line from Vientiane to Mu Gia at the border with Viet Nam (pre-feasibility study completed in March 2011), as well as a 222 km line from Mukdahan at the Thai-Lao border to Lao Bao at the border with Viet Nam, (pre-feasibility study completed in September 2009) with an onward link to Viet Nam’s Danang port. As regards the latter, in November 2012 the Laotian government awarded a 50-year concession contract worth $5 billion to a Malaysian contractor which will have to construct and operate the railway.

On a smaller scale, the extension of the rail link from Nongkhai, Thailand, to Vientiane, for which Thailand has agreed to provide financial support, could be finished by 2014 (the first step of which was completed in March 2009 with the inauguration of a 3.5 km extension of the Thai network from Nongkhai to Thanaleng in Lao People’s Democratic Republic). Coupled with the development of an Inland Container Port in the vicinity of Vientiane, the line will facilitate rail movement to the port of Laem Chabang (140 km south-east of Bangkok) on the Gulf of Thailand and, further south, to the port of Port Klang (Malaysia) on the Strait of Malacca.
In Viet Nam, an investment programme worth $9.5 billion over three years was approved by the parliament in 2012, paving the way for the country’s railway to undertake significant modernization work on key corridors of its network. The package focuses on raising line speeds to 120 km/h on large sections of the predominately metre-gauge network, in particular on the 1,500 route-km main line between Hanoi and Ho Chi Minh City (completion expected for 2015). Through these projects, Viet Nam Railways expects to increase freight volumes from 7 million tonnes in 2011 to 13.7 million tonnes by 2015 (+95 per cent), while increasing passenger ridership from 12 million passenger-journeys to 17.7 million (+47.5 per cent).16

In Thailand, the Government has proposed a package for infrastructure development of around $65 billion to finance projects which could start already in 2014. These projects are part of the Government’s long-term development plan, which are being expedited by a commitment to infrastructure investment in view of the forthcoming ASEAN Economic Community in 2015. The largest share of the package, i.e. approximately $43 billion, is expected to be directed towards developing or improving the country’s rail network, including through the construction of four high-speed passenger lines (see Box 1.9) and the doubling of 3,000 route-km of metre-gauge lines. This is expected to have a considerable impact on the connectivity of Thailand with its neighbours once the missing links have been put in place.17

Other important projects being implemented or considered for passenger rail transport in the region include an agreement between the Governments of Malaysia and Singapore to build a high-speed line between Kuala Lumpur and Singapore under a PPP modality, for which construction and land acquisition costs could reach $8 billion. Completion of this project is envisaged for 2020. In addition, another fast passenger line under consideration using the PPP modality is the 144 route-km between Jakarta and Bandung in Indonesia, to be opened by 2018.18 Meanwhile, the Government of Indonesia is also developing a number of coal lines in the Kalimantan and Sulawesi regions of the country under PPP modalities.

**Box 1.9**

**Projected High-Speed Lines in Thailand**

- Bangkok – Nakhon Ratchasima: 256 km, $5.3 billion
- Bangkok – Hua Hin: 225 km, $3.85 billion
- Bangkok – Rayong: 221 km, $3.1 billion
- Bangkok – Chiangmai: 745 km, $12 billion
While being an important step, building infrastructure is likely to be insufficient to meet the growing transport demand if not combined with an increased level of integration between the different transport modes. Promoting intermodal integration is not only useful from an economic perspective; it is also a means to improve the sustainability of transport systems in the region. To date, the focus on development of sustainable transport has been very much on urban transport (mainly passenger transport), but increasingly attention is being given to issues relating to the “greening” of long distance freight transport as well as the need to better integrate different transport modes.

A number of socio-economic considerations give added urgency to the development of an integrated intermodal transport system. The growth of world populations and their increasing affluence will continue to amplify global demand for traded products. At the same time, existing modes which are mostly being used independently are being stretched to capacity, and policy makers realize that the building of new infrastructure will not be able to keep pace with this increase in demand. Finally, at a time when the environmental performance of many industries is improving, the transport sector remains a major contributor to greenhouse gas emissions and continues to be highly dependent on fossil fuels for its operation. In this regard, the outcome document “The future we want” adopted at the United Nations Conference on Sustainable Development (Rio+20) in June 2012 calls for governments worldwide to put in place policies to provide better access to goods and services in support of economic and social development, while at the same time minimizing the negative impacts of a rapidly growing transport sector.

In this context, developing intermodal transport corridors seems to offer a framework within which the above concerns can be addressed in an inclusive manner. These corridors provide a framework for countries to put in place efficient intermodal transport and develop their logistics industries, thereby giving the ESCAP region an opportunity to keep its global economic position, expand benefits for the labour market, and continue to improve the standard of living of its people.

International intermodal corridors are, however, marked by a large number of interfaces between numerous stakeholders at the planning and operational stages. Achieving modal integration will thereby require making these interfaces extremely efficient. In addition, the links between these interfaces need perform smoothly to be able to reap the full benefits of intermodalism. Different initiatives are being pursued to promote these interfaces, particularly through the development of dry ports is gaining importance, while many efforts are also concentrating on enhancing connections between inland logistic hubs and key maritime ports.

**DRY PORTS**

To enable the emergence of truly intermodal networks, the interfaces between the different transport modes need to be improved. With the support of ESCAP, governments in the region have developed and adopted the Intergovernmental Agreement on Dry Ports, which will be open for signature at the second session of the Forum of Asian Ministers of Transport in November 2013. Such an agreement should serve as the basis for the coordinated development of these
critical nodes in an international integrated intermodal transport and logistics system.

It is anticipated that formalizing the development of dry ports through an intergovernmental agreement will (a) promote international recognition of dry ports, (b) facilitate infrastructure investment by attracting strong commitment of member States and increased financing from international banks and bilateral donors, (c) encourage a more harmonized approach to the development and operation of dry ports in the region through enhanced collaboration with the private sector, and (d) contribute to the development of an efficient logistics industry in member States. Some of these benefits are elaborated below.

**BOX 1.10**

**WHAT IS A DRY PORT?**

A “Dry Port” provides all of the services of a port except for the loading of cargo to and from seagoing ships. It may be distinguished from an Inland Container Depot (ICD) in that it can accommodate all types of cargo, whereas an ICD specializes in the handling of containers and containerized cargo.

**A win-win solution**

Provided they are correctly planned and respond to well-identified needs, dry ports can provide significant advantages to shippers, as well as to the governments that support their development. The two different perspectives are presented below.

**The “Shipper” perspective**

From a shipper perspective, the existence of professionally managed dry ports connected to different transport modes creates the right conditions to realize a shift towards a more efficient transport mode. Having access to well equipped and connected inland logistics centres, shippers can take advantage of the efficiency of rail transport or inland water transport over long or medium distances more easily, while limiting road transport to the “last mile” of their trips.

Dry ports can also improve regional network connectivity by lessening the burden created by mandatory transshipments. The latter can include breaks of gauge in the rail network or obligations to change vehicles due to regulatory provisions. These can be handled optimally at dry ports where modern trans-loading equipment should be available.

**BOX 1.11**

**WHAT IS A BREAK OF GAUGE?**

A break-of-gauge occurs when the railways of neighbouring countries have different track gauges as, for example, between China and Kazakhstan, or the Islamic Republic of Iran and Turkmenistan. However, discontinuity of track gauge also occurs within individual domestic railway networks. Such is the case, for example, in Bangladesh, India and Viet Nam. Various techniques exist to overcome these discontinuities. They include transhipment, bogie exchange and the use of variable gauge bogies.

In addition, dry ports can serve as logistic hubs where functions like distribution, packaging, labelling or warehousing could be outsourced with the objective of reducing the overall cost through economies of scale. Consolidation of LCL (Less than container load) shipments can also be realised at these facilities, resulting in additional cost savings.

Finally, when provided, the possibility of accessing round-the-clock customs services can be very valuable in facilitating the clearance of all administrative documents related to transport activities.

**The “Government” perspective**

Ideally, national economies would reap the financial benefits from investments in such facilities through trade opportunities triggered by higher logistic efficiency. Meanwhile, governments can collect increased revenues in corporate taxes, the private sector can gain from enhanced competitiveness, and the local population can have access to wider employment opportunities.
Indeed, efficient transport and the clustering of industries and logistics services around intermodal interfaces play a critical role in the decision of industries to establish production units at specific locations. As such, developing dry ports may create economic stimuli by attracting manufacturing, agricultural processing and associated activities. In addition, dry ports could be developed into special economic zones with a much broader industrial and service base. Similar growth potential has existed around seaports that have brought prosperity to coastal areas by clustering economic activity and services, which has in turn attracted further economic factors of production, particularly a constant pool of mobile and well-trained labour, in a self-perpetuating process.

Other positive spillovers can also be expected. For instance, by allowing an increased shift from road to rail for medium-long distance trips, dry ports can have a moderating impact on the number of kilometres travelled by trucks, which should ultimately result in reduced road maintenance costs, fewer road accidents and lower greenhouse gas emissions. This would be particularly significant for port cities, which may also benefit from reduced congestion from trucks servicing their ports.

Finally, budgetary investments should be relatively limited as activities at dry ports have the potential to be profitable, making dry ports a good candidate for private investments through PPP solutions. Public investments would nevertheless be expected to provide connecting transport infrastructure, water supply systems, power supply systems, and customs services. On the other hand, the private sector could finance, provide and operate the container handling equipment.

Box 1.12 describes some of the activities implemented by ESCAP over the past year to enhance the capacity of member countries to plan, develop and operate dry ports of international importance.

ESCAP is working on a review of best practices in the establishment and operation of dry ports. Areas under review cover (a) features of a Dry Port, (b) insight into possibilities and problems for Dry Port realization, (c) consideration for options for Dry Port funding and management, (d) communication between Dry Ports and other actors in the logistics chain, and (e) description of ICT technologies for efficient Dry Port management. Case studies / best practices in the ESCAP region as well as Europe and North-America will then be used to draft policy guidelines which can assist transport policy makers of the region in planning Dry Ports in their countries. The initial review findings were presented at a subregional seminar held in Busan, Republic of Korea, on 11 and 12 June 2013 for countries of North and Central Asia and East and North Asia. ESCAP is planning to hold a similar sub-regional meeting for countries of South and South-East Asia in 2014.
Selected examples of dry port development in the region

Recognizing that an important factor in unlocking trade is the availability of adequate logistics facilities and services, a number of countries have started to implement projects to develop modern facilities or upgrade existing ones. Table 1.1 below lists selected dry ports in the ESCAP region.

### BANGLADESH

In addition to the existing ICD operating in Dhaka located in a heavily congested area adjacent to the Kamalapur Passenger Railway Station, the construction of a new ICD at Pangaon on the Buriganga River near Narayanganj, about 13 km by waterway south of Dhaka, was completed in late 2012 and is expected to operate from August 2013. This facility, which is being developed jointly by the Bangladesh Inland Waterway Authority (BIWTA) and the Chittagong Port Authority (CPA), will be operated under a contract awarded to a private operator under a competitive bidding process. The overall development cost of this facility is approximately $23 million and it will have an annual handling capacity of 116,000 TEU initially, later expanding to 160,000 TEU. According to CPA representatives, carrying costs through waterway will be much cheaper than by road and railways and it will take 16 hours to carry goods from the Chittagong end.

A second ICD has been proposed at Dhirasram Bazar (close to Tongi industrial area), some 28 km by road and rail north of Dhaka. It is understood that this facility was proposed in conjunction with the development of the deep-sea port at Sonadia. While plans for the development of this facility have yet to be finalized, its expected capacity will be several times that of the ICD at Pangaon. Located on the Chittagong – Dhaka rail corridor, the facilities are expected to substantially reduce the cost of container movements.

### INDIA

In India, in view of the region’s containerization trends, the Government set up the Container Corporation of India Limited (CONCOR) in March 1988 with the prime objective of managing changes in India’s logistics industry. Since its creation, CONCOR has put in place an extensive network of 62 Inland Container Depots, of which 48 are export-import depots. The terminals are almost always linked by rail to the Indian Railway network, unless their size or location dictates that they be linked by road. The efficiency of interfaces between agencies and modes has seen CONCOR container traffic jump from 1,044,728 TEU in the year 2000-01 to 2,604,311 in the year 2011-12 (mainly transported by rail). The dry port policy of CONCOR is taking on new relevance under the Government’s Delhi-Mumbai Industrial Corridor project, which includes the construction of a dedicated freight corridor (DFC) with a number of logistics parks along the route.

### INDONESIA

In Indonesia, the Government has long been implementing several dry port projects, most notably at Gedebege, Surabaya, Solo and Cilegon. However, the Government’s flagship project in the area of dry port development is the Cikarang Dry Port, strategically located in Jababeka Industrial Estate, which lies in the heart of the biggest manufacturing zone of west Java and is a manufacturing base for over 2,500 industrial companies. These companies generate over half the total container throughput of Indonesia’s main container port at Tanjung Priok which, in 2011, handled over 4.7 million TEU. Approximately 200 hectares are allocated for Cikarang Dry Port, which is accessible by the highway and railway system. Being the extension gate of Tanjung Priok, document formalities for port clearance and customs clearance are completed at Cikarang. The development of Cikarang Dry Port is one of several initiatives by the Government of Indonesia to streamline and increase the country’s competitiveness.
KAZAKHSTAN - CHINA

The Governments of China and Kazakhstan have been cooperating on the development of the “Khorgos-East Gate” free economic area located in the south-east of Kazakhstan, just a kilometre away from Kazakhstan’s border with China. The area includes Khorgos International Centre for Cross-Border Cooperation, centres for trade activities, a dry port, a transport and logistics complex, an industrial area and space for industrial companies. The project, which is included in the strategic plan for the development of Kazakhstan by 2020, has an estimated cost of around $3.5 billion, of which around 75 per cent is to be covered by private investments.

NEPAL

As already mentioned in this Chapter (see Box 1.4), the Government of Nepal has developed the Birgunj ICD with World Bank financial support. The ICD has a 12 km rail link to the Raxaul railhead at the Nepal-India border with further rail connection to the Kolkata/Haldia port complex in India. It is equipped with the automated United Nations-sponsored system for customs data (ASYCUDA). To ensure smooth movements of trade the Government of Nepal concluded a rail service agreement with India for the operation of dry ports. The Birgunj facilities are leased to the private sector for operation. It currently handles containers, tank wagons for liquid cargo, and flat wagons for bilateral break-bulk cargo, receiving an average of around 15 - 16 freight trains per month. In a country in which climate change and global warming can have serious consequences, the potential for emission reduction of the rail-based Birgunj facilities is an important reason behind the further development of the facilities.

REPUBLIC OF KOREA

In the Republic of Korea, Uiwang Inland Container Depot (ICD) – located 25 kilometres from Seoul – was developed in 1992 by Korean Railroad and a number of private transportation companies. It currently handles over 1 million TEU per year. The provision of rail sidings at the site has contributed to a modal shift towards rail transport and contributed to reducing road congestion and CO₂ emissions along the Seoul-Busan corridor. Currently, the site has a capacity to handle 36 trains per day. The facilities at Uiwang have also contributed to reducing congestion at the port of Busan while providing employment to 1,000 people and generating tax revenues for local government.

UZBEKISTAN

The Government of Uzbekistan is developing intermodal corridors and dry ports in the country, in particular at Angren in the Tashkent region, to serve the Andijan, Namangan and Ferghana regions of eastern Uzbekistan, and Navoi, 350 kilometres south-west of Tashkent. The Navoi dry port has been developed in connection with the Navoi Free Industrial Zone (FIZ) close to the international intermodal hub at Navoi airport which began operation in 2009 under management of Korean Air. The facilities are located along major subregional road, rail and aviation routes to capitalize on the country’s transit potential. Concomitantly, the Government has implemented a number of policies in the form of tax incentives and exemption of customs fees to encourage industries to cluster in the Navoi FIZ.
ROAD - RAIL - MARITIME LINKS

While the previous section highlighted the ongoing initiatives to enhance inland interfaces of international transport corridors, this section will investigate the potential for increasing the use of rail for transporting goods from inland centres to key maritime ports. This issue is particularly important as improving the efficiency of these critical rail-port links is instrumental for the success of intermodal transport corridors and ultimately for the sustainability of Asian transport systems.

Current Modal split

To have a better understanding of the current situation in the region, a short review of the modes of transport used between selected inland centres and key maritime ports in four countries has been conducted. These countries include Bangladesh, China, Thailand and the Russian Federation.

For Bangladesh, the traffic flow between Dhaka and Chittagong, the Bangladesh’s sole container port located 264 km by road and 346 km by rail southeast of Dhaka was studied; while for Thailand, the link between the largest Thai port (Laem Chabang International Port handling approximately 6 million TEU in 2012) and the rail-served Inland Container Depot (ICD) at Lard Krabang was considered. As regards the Russian Federation, three ports in the Far East have been included, namely Vladivostok, Vostochny, and Nakhodka, which together handled close to 1.5 million TEU in 2012. In the case of China, no detailed figures were readily available as regards rail-carried containerized freight per ‘origin-destination’ so the country’s overall port throughput was compared to the volume of containers transported by rail at a national level. The key results are presented in Figure 1.11 below.

What is striking from the above Figure is that the market share of rail over carriage by roads remains very low in most countries, despite widely acknowledged advantages of rail from an economic and environmental point of view (see Box 1.13). For instance, rail container volume in China represented less than 2% of the overall port throughput in 2007.24

FIGURE 1.11
ESTIMATED MODAL SHIFT IN THE SAMPLE AREA

NOTE: Data for this figure was mainly drawn from publicly available online sources, and should therefore be treated as estimates.
- Cost competitive mainly over medium distances (e.g. 300+ kilometres) due to economies of scale (many tons of freight and passengers can be moved via a single vessel)\(^22\);
- Energy efficient and low carbon emissions. A study estimated that CO2 emissions by rail are almost 8 times less than trucks for freight carried over a distance of 700 kilometres while it was twice more energy efficient;\(^23\)
- Smaller land requirement for right-of-way and smaller impact on water drainage or nearby waterways.

Another interesting result which is not reflected in Figure 1.11 is that the volume of freight transported by rail has actually increased in all four countries. However, it has increased less rapidly than the volume of container throughputs handled in most related ports, resulting in a diminishing modal share for rail in all countries but China.

With all forecasts predicting continued economic growth for the fast-developing countries of the ESCAP region, the challenge is to put in place a transport system best able to provide the services that are necessary for their continued, long-term economic and social development, while reducing inefficiencies and imbalances, and safeguarding against the harmful effects that transport activities generate. Against this background, the rest of this section will try to identify some policies and actions that can be implemented to trigger modal shifts.

**Conditions for modal shift**

The overall volume of containers traded between Asia and Europe and within Asia represents a sizeable market. Through greater cooperation and coordination amongst railways in the Trans-Asian Railway network, the railways have the potential to develop efficient land-bridge operations which offer shippers a guaranteed level of services at rates which are competitive with those of competing modes.

The high safety record of railway, its substantial possibilities for fast transit times and its potential for improved levels of services, including the use of modern Information and Communication Technologies, are inherent assets on which the railways can capitalize to increase their market share. The fact that current container volumes moving by rail are marginal shows that these qualities are not readily perceived by shippers or freight forwarders. Some options to address this issue are presented below.

**Common standards and operating principles**

One of the reasons why shippers may be reluctant to use rail, especially for international routes, is because rail is not viewed as one solid, reliable transport mode but as a conglomerate of various systems without unity. Yet, examples exist which show that the trend can be reversed. The growth of intra-Asian trade, together with the need to promote the development of hinterland areas, offers a vintage opportunity for the railways to develop and promote the image of a unified, efficient and, above all, quality-conscious transport operator.

To achieve this, one important step will be to ensure that all concerned (all staff in each railways and other administrations) are aware of their respective responsibilities and of how the performances of each of them fit into the global transport process and ultimately relate to the success of the enterprise. One of the main challenges in setting up international services is to define and maintain clear areas of accountability for every single part or function within the international transport chain. Keeping up service quality at the desired level in a complicated transport chain demands:

- full awareness of customer demands and the importance of total quality management systems among the entity in charge of developing and monitoring services,
- a great degree of personal accountability and constant motivation of all partners along the whole transport chain,
- care for all performance details of the
product purchased by the customer.

Delivering high quality services is all the more important for transport operators as delivery is instant and visible: trains are on time or not; services match promises or do not; the final invoice has or does not have last-minute, unannounced add-ons; goods are delivered undamaged or not. Examples where rail has managed to effectively compete with other transport modes are along the so-called “Northern Corridor” which are further developed in Box 1.14.

**BOX 1.14**

**SERVICE ON THE NORTHERN CORRIDOR**

In the Russian Federation, container block-train services along the Trans-Siberian main line continued to show impressive growth. While standard container services take 11 to 14 days to cover the 9,400 km distance between the port of Nakhodka and Moscow, in May 2013 Russian Railways, together with its TransContainer subsidiary and Vostochnaya Stevedoring Co., launched an express service that shortened the travel time to 7 days. This improved transit time is the result of extensive investments by Russian Railways to increase capacity along the main line.

In China, a 5-days-a-week direct rail freight service was launched in May 2011 between the Port of Antwerp, Europe’s second-largest port, and Chongqing, the industrial hub in China’s southwest. West-bound cargo largely includes automotive and technological goods, and eastbound shipments are mostly made up of chemicals. Meanwhile, since September 2011, Schenker Rail Automotive, the German Railways’ automobile specialist in rail freight transport, has managed some 200 container trains filled with automobile parts travelling from Leipzig and Wackersdorf in Germany to the BMW Shenyang plant in the Liaoning province of China. In both cases, while rail freight routes are more expensive than maritime shipping, the 20 to 25-day rail transit times are twice as fast as their ocean-going counterparts, presenting a very attractive business opportunity for high-value-added products such as automobiles.

Adequate pricing practices

Of particular importance in the relationship between railways and shippers is the issue of rates. While shippers understand that moving volumes has a price and that transport operators need to generate sufficient revenues to cover costs and maximize the net income earned for each individual shipment, they have greater difficulty accepting frequent or sudden rate volatility. Such fluctuations in rates make budgeting difficult and often force businesses to absorb the cost changes as they are often not in a position to put up the selling price of their products.

In a 2012 survey of railway organizations carried out by ESCAP, 33.5 per cent of respondents admitted changing rates twice a year or more. Meanwhile, 58.5 per cent of railway use media or website to announce rate hikes with only 25 per cent using direct contact to inform customers.

Negotiating long-term contracts between shippers and railways could therefore be a suitable solution offering more stability in the long run. It is, however, important that the terms and conditions governing these contracts be transparent and available to all. In this way, rail tariffs would be transparent and predictable, making them comparable to shipping tariffs which have historically been negotiated under the framework of long-term contracts. To be effective, the terms of the contracts negotiated in good faith have to be observed. This applies to the rates of freight being moved under some form of contractual arrangements. Yet the survey shows that some of these practices are still to be followed in many countries of the region (see Figure 1.12).
At a country level, it is worth noting the recent offer by Russian Railways to completely de-regulate tariffs for transit transportation of containers, as well as for perishable goods and aluminium products. Such a move introduces the possibility of negotiating long-term contracts with container customers that could embody tariff incentives based on the container volumes committed to rail over a specified period.

**Capacity constraint alleviation**

The pressure for continuous cost-reduction in industries, and the development of modern management methods favouring limited stock and just-in-time deliveries, makes it compelling for shippers to turn to transport operators with near-perfect records in terms of reliability, punctuality and frequency. Those critical elements will not materialize if railways continue to have serious capacity constraints and leave shippers “screaming for space”. Yet, the 2012 survey revealed that 58.5 per cent of railway organizations experience such constraints in one or more of the following areas: mainline capacity, terminal capacity or shortage of rolling-stock.

These capacity constraints have a direct impact on the frequency of services that railways can offer, and therefore diminish their capability to ensure that the intervals between two consecutive services of a certain type match a shipper’s production pace, avoiding a situation whereby the shipper has to create and keep significant stocks.

For railways in the TAR network, putting together competitive schedules will result not so much on speed during main line operation, as on the organization of operations between terminals at both ends of the routes. This translates into a reduction of stops and a reduction in the length of the stops that are unavoidable. In this respect, Box 1.15 described how the design of a port can greatly influence the productivity of rail operations.

**BOX 1.15**

**OPTIMIZATION OF PORT LAYOUT PLANS**

Very few, if any, ports of the region have layouts which are compatible with the efficient operation of container trains. Typically, rail loading/unloading tracks are of insufficient length to accommodate full length trains and are located too far from berth-side container stacks to allow single lift loading and unloading operations using port handling equipment, such as portal cranes or reach-stackers. Consequently, far from encouraging a modal shift from road to rail, the layout of most ports actually reinforces the predominance of road transport for container movements. The elimination of container double handling as much as possible inside ports could significantly reduce costs as well as the efficiency of container services by rail.
Priority settings

Another way to reduce the number of stops is to afford freight block-trains the same priority as “flagship” passenger trains in the scheduling of services as well as in the daily running of operation. While this idea frequently receives a nod from railway managers, in practice unprofitable passenger services still often get priority over more remunerative freight services.

The 2012 survey showed that 88 per cent of railways give priority to long-distance passenger trains. None of the railways mentioned freight as receiving top priority and when block-trains move up the priority ladder, it is only to second place (only 25 per cent of respondents) or third place (62 per cent of respondents).

The low priority given to freight also has an impact on punctuality. In the quoted 2012 survey, 37.5 per cent of railway organizations still rated their punctuality record as average, and of those, 65 per cent admitted not informing their customers of new expected arrival times, preventing shippers from making contingency plans.

The emergence in different countries (e.g. China) of high speed passenger rail programs may alleviate freight capacity constraints. This is because the development of high speed rail passenger services necessarily involves the construction of lines dedicated exclusively to the operation of specialized, high technology electric train-sets at speeds of up to 350 km per hour. This new passenger-only rail infrastructure will release track capacity by diverting passenger traffic from existing mixed-traffic lines.

Having dedicated tracks for freight could also help solve these traditional conflicts between freight and passenger services. In India, the Government has developed a vision of dedicated freight corridors across the country. In the first phase, two corridors will be constructed, namely a 1,839-km eastern corridor from Ludhiana to Sonnagar and a 1,483-km western corridor from New Delhi (Dadri) to Mumbai.

Customized services

Understanding the value of specific services in a shipper’s supply chain and production pattern is essential if services are to match requirements. Yet, in this area, shippers often express frustration at the lack of understanding among transport operators of their supply chain needs and the impact of service deficiencies on their business activities further up the chain. In this regard, railway organizations still need to develop a proactive approach in the way they develop and maintain relationship with customers. Indeed, the 2012 survey showed that while 73 per cent of railway organizations claim that they assess the value of the service in the overall supply chain of customers, 58 per cent of them have no policy to differentiate market segments and only 50 per cent of them have specific officers to handle container traffic.

In some countries, institutional reforms have been implemented to customize services according to different market segments. In the Russian Federation, for example, this was achieved by creating 63 subsidiary companies (e.g. JSC TransContainer or Rail Passenger Directorate) under the state-owned railway company RZD. The capital of some profitable subsidiaries was opened to the public while some joint ventures were created with local government for suburban passenger services, allowing local governments access to financial support for loss making services.

In China, the importance of having a specialized agency to manage the development of and to operate intermodal rail services was recognized in 2003. For this purpose, the China Railway Container Transport Corporation (CRCTC) was established as a wholly owned subsidiary. More recently, the CRTC was re-established as a joint venture company, CR Intermodal, with private sector shareholding added to its own shareholding, including those of: NWS Holdings of Hong Kong (container service provider); CIMC (container manufacturer); Luck Glory (Hong Kong based investor); and DBML (subsidiary of the German railway company, Deutsche Bahn). The re-structuring of its container logistics operations with an infusion of private sector shareholding seems to have provided
the commercial and logistical expertise necessary to manage these operations profitably and in a manner satisfying the needs of container customers.

**Use of cost efficient rolling stock technology**

In a highly competitive environment like the transport industry, railways have to continuously seek solutions to raise productivity. In this respect, different attempts have been made to increase the payload of container block-trains. In China, the approach has been to develop a network of inland intermodal hubs based on port-hub and hub-hub through-operation of fixed formation container trains, each comprising 40 double-stack wagons and conveying up to 160 TEU (see Box 1.16). Double-stack container trains have the potential to reduce the cost of freight as they can double the capacity of standard single tier wagons, but with only a marginally greater tare weight (22 tonnes vs. 19.5 tonnes). In India, double-stack operation has also been used for a number of years. For example, Pipavav Railway Corporation (a joint venture between the Ministry of Railways and Gujarat Pipavav Port Limited) has been operating double-stack container train since 2006, notably on the 270-km rail section that it constructed under a PPP modality between the Pipavav port terminal and the Indian Railways railhead at Surendranagar (Gujarat).

**Box 1.16**

**INTERMODAL HUBS AND DOUBLE STACK OPERATION IN CHINA**

China offers excellent conditions for intermodal container transportation. The relocation of production facilities from the coastline to central China will increase average transport distance and further raise the attractiveness of combined rail solutions which have a competitive edge in medium to long distances. Against this backdrop, the development of intermodal transport is receiving renewed attention with a target to increase rail container volume to 10 million TEU (from about 5 million TEU currently) over a medium term horizon.

To accompany this growth, China is investing in facilities and track infrastructure. Significantly, over the period 2010-2020, Chinese Railways is planning to adapt about 16,000 km of its railway routes for the operation of double stack container trains and to establish a network of dedicated rail container terminals, connecting the ports with key inland manufacturing centres. By 2020, this network is expected to comprise of 18 major intermodal rail hubs and 40 mid-size container freight stations. Out of the 18 intermodal hubs to be interconnected to themselves and the ports by double stacked container rail services, nine of them are already operational.
Another approach has been implemented in the Russian Federation where longer single tier wagon having a capacity of two 40ft containers have been deployed, resulting in a total train length of slightly less than 1,000 metres. While en-route infrastructure can accept trains of this length, it appears that the limited length of container loading/unloading tracks of the ports in the Far East of the country requires the splitting and re-assembly of trains in marshalling yards outside the port.

Both approaches have limitations. For the double stack concept, limitations include those imposed by structure and loading gauge restrictions on many trunk lines throughout the region. The Chinese Railway Corporation has a commitment to overcome these restrictions on its existing lines, but the adaptation of its network requires investment on a scale which would be beyond the financial resources of most countries of the region. A similar observation can be made about the approach of the Indian Railways which is focusing on the construction of new dedicated freight lines to operate block-trains.

On the other hand, the alternative approach of the Russian Railways to achieve increased container haulage capacity by adopting long single tier wagons imposes other limitations, such as the need for tracks with long curve radii, while the continuing use of short single tier wagons offers limited scope for capacity expansion.

There is an intermediate solution involving the use of a single tier wagon of 20.2 metre length with capacity to load three 20ft containers (the “3 TEU wagon”). So far, this type of wagon has been used mainly on the standard gauge railway networks of Australia and, most recently, the Republic of Korea, but it can also readily be applied on narrower gauge networks which already have the requisite axle load limit of 20 tonnes. Its loading efficiency is identical to that of a skeletal 2 TEU wagon, but trains comprising only 27 x 3 TEU wagons can carry the same number of containers as trains comprising 40 x 2 TEU wagons, with a small saving in train length and a large saving in unit operating costs, owing to the smaller number of wagons required and the lighter overall train gross weight.

It should be noted that the three technologies presented above depend on the widespread use of containers. While container traffic has increased tremendously over the last decade (almost tripled from 107 million TEU in 2000 to 302 million TEU in 2010 in the
ESCAP region\(^1\)), there remain some scope to further increase levels of containerization in the region. For instance, whereas the level of containerization as a percentage of general cargo is higher than 70 per cent in China and Europe, and is of the order of 68 per cent and 54 per cent respectively in the United States and India, it is still only around 35 per cent in the Russian Federation.\(^2\)

**Coherent policies across mode**

While transport operators can only try to increase the attractiveness of the services they provide, policy makers can significantly impact the level playing field in which each transport mode operates. Three examples of policies that can affect users’ modal choice are outlined below.

**Investment strategies:** Allocation of public investments in transport infrastructure across sectors significantly influences the competitiveness of each transport mode. For instance, investment in high quality multi-lane road access to ports will be detrimental to rail competitiveness. As will be further elaborated in Chapter 3, the road sector has traditionally received substantially more investment than rail. As such, there is a need to have consistent principles that apply across transport modes instead of having individual sub-sector approaches.

**Recovery of road maintenance costs:** There is little evidence that the road maintenance costs caused by heavy trucks are adequately recovered from operators in any country of the region. In some countries, road maintenance costs are recovered in total from fuel taxes, vehicle import duty, and fixed registration and license fees, but implicit in these tax receipts there is a large cross subsidy from private vehicle to commercial vehicle operators. The railways of some of the region’s countries (e.g. Thailand) are able to offer container haulage rates which are competitive with road transport but still sufficient to cover at least incremental capital and operating costs. Other countries, however, risk not being able to recover their incremental costs by maintaining artificially low trucking rates. In such cases, artificially low trucking rates could both damage the profitability of the railways and deny them access to container traffic. Despite the desire of many of the region’s governments to avoid regulation of the transport industry, there is at least a need to take action to create an equitable basis for modal competition, which will in the longer term ensure a shift towards sustainable transport.

**Application of road axle load limits:** Most countries in the region apply limits on the gross weights, or axle loads, of cargo carrying trucks in order to restrict damage to road surfaces, but few enforce these limits rigorously. In some countries, truck weight limits are reinforced by the application of limits on truck dimensions. While the main aim of these restrictions is to preserve road surfaces, it can also encourage modal shifts for some types of freight transport, as long as alternative modes are available.

In conclusion, the above points have highlighted that if railways are to fulfil a greater role in the region’s transport system, rail freight needs to become more shipper-friendly, cost efficient and customer-focused, while government policies need to be more comprehensive and clearly spell out the respective role of each mode in the country’s transport system.
END NOTES

1 ASEAN (2011) and IMF Direction of Trade Statistics (DOTS) online database accessed on 25 September 2013
2 ESCAP internal modeling estimates
5 Asian LLDCs comprise Afghanistan, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, Lao People’s Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan and Uzbekistan
6 World Bank video on http://www.youtube.com/watch?v=tMEtNb8Gqgs accessed on 30 August 2013
8 ESCAP estimate based on 2011 country figures and historical trends.
9 From the publication of “Roads in Korea 2011” of the Ministry of Land, Transport and Maritime Affairs, of the Republic of Korea
19 See Chapter 4 for more information on urban transport in the ESCAP region
23 Container tariffs are currently partially regulated. Approximately 56 per cent of current container tariff levels are subject to discounts off scheduled charges for empty running where customers provide their own containers and/or wagons. The remaining 44 per cent of current tariff levels, covering the provision of infrastructure and locomotives, applies to loaded running and is set by the Ministry of Transport of the Russian Federation. The absolute level of this portion is fixed, i.e. it is not subject to discount or negotiation (source: A.T.Kearney Inc (2010))
24 High-speed lines can also be used for light freight such as mail and small parcels as traditionally handled by specialized courier services.
28 ESCAP Data Centre http://www.unescap.org/stat/data/